



Japanese Patent Laid-open No. 62-25096

Specification

1. Title of the Invention

Semiconductor Device Embedded Card

2. Claims

1. A semiconductor device embedded card, wherein:  
a card body has a structure with laminated layers;  
at least one of the layers has a structure in which  
partial regions in a crosswise direction and in a  
lengthwise direction intersected each other and formed at  
the substantially central portion of the card body becomes  
bent more easily than other regions of the card body; and

a semiconductor device is embedded at a position  
which is eccentric to the center of the card body excluding  
the partial regions.

2. The semiconductor device embedded card according  
to Claim 1, wherein

the partial region is formed of a flexible member  
different from members used to form the other regions of  
the card body.

3. The semiconductor device embedded card according

to Claim 1, wherein

the partial region is of a depletion layer.

### 3. Detailed Description of the Invention

#### [Technical Field of the Invention]

The present invention relates to automatic transaction devices, more particular to a semiconductor device embedded card carried by a user.

#### [Technical Background of the Invention and the Problems]

This type of the semiconductor device embedded card (hereinafter referred to as an "IC card") carried by a user is generally required to have a structure for protecting a semiconductor device (hereinafter referred to as an "IC chip") embedded in the card from a deflection of the card which may be caused by an external force. To realize the above, a "verification card device" disclosed in JP-B-53 29260 is known. For the "verification card device", since an IC chip is mounted at a position which is eccentric to the center of a card body, a large bending stress caused by an external force is not applied to the IC chip.

Using such an IC chip mounting structure described above makes it possible to accomplish the desired purpose with respect to a bending stress caused by an external force during the normal use of the card. Even if the above

IC chip mounting structure is adopted, however, it is difficult to meet the requirement in which a card bears an external force applied in the shorter direction of the card while the length of a bending at the central portion of the card is equal to or less than 2 cm. The requirement is expected to be an international standard.

[Object of the Invention]

The present invention has been made under the abovementioned circumstances, and its object is to provide a semiconductor device embedded card capable of protecting a semiconductor device embedded in the card even if the card body has become largely bent due to an external force.

[Summary of the Invention]

The card body according to the present invention has a structure with laminated layers. At least one of the layers has a structure in which partial regions in a crosswise direction and in a lengthwise direction intersected each other and formed at the substantially central portion of the card body becomes bent more easily than other regions. The semiconductor device is embedded at a position which is eccentric to the center of the card body excluding the above regions. With this structure, the semiconductor device embedded in the card can be protected even if the card body has bent due to an external force.

[Embodiments of the Invention]

A description will be made of an embodiment of the present invention with reference to drawings.

In Figs. 1 and 2, reference numeral 1 denotes a card body made up of a plurality of layers. Reference numeral 2 denotes an intermediate member included in the card body 1. The intermediate member 2 is constituted by a flexible member 2A and a highly flexible member 2B that becomes bent more easily than the flexible member 2A. The flexible member 2B is of belt-like regions in a crosswise direction and in a lengthwise direction intersected each other that are formed at the substantially central portion as shown in Fig. 1. Reference numeral 3 is an IC chip (a semiconductor device) mounted at a position which is eccentric to the center of the card body 1 excluding the regions made of the flexible member 2B.

With such a structure described above, a stress is concentrated at a portion excluding the IC chip so that an external force is deviated from the IC chip implemented portion. This makes it possible to securely protect the IC chip even if the card has bent due to an external force.

More specifically, a layer having a higher flexibility portion excluding the IC chip is formed as described above. Further, the layer is used as one of the

plurality of layers for the card body 1 as shown in Fig. 2.

If a portion bends first due to an external force applied to the IC card, the other portions in which the IC chip is embedded are less stressed. This makes it easier to prevent the IC chip 3 mounted in the IC card from being broken. In other words, by making the physical strength of the card nonuniform, the portion (for mounting the IC chip 3) which needs to be strong can be protected while the other weak portions receive stresses.

The structure can realize a IC card that can meet the abovementioned requirement in which the IC chip is not broken while the length of a bending at the central portion of a card is equal to 2 cm.

Fig. 3 shows an IC card according to another embodiment of the present invention. In the structure of the IC card, regions made of a highly flexible member 12B formed in a flexible member 12 for a card body 11 extend up to the edges of the card body 11.

With this structure, the same effects as those in the first embodiment can be provided.

Incidentally, according to the structure in the first embodiment, the cross-shaped region is formed of the highly flexible member in the only one intermediate layer. The present invention, however, is not limited to the

structure according to the above embodiment and may have a structure having such regions described above in a plurality of intermediate layers, or a structure having a depletion layer instead of the highly flexible member formed therein, or a structure having a highly flexible region in a shape other than a cross, or the like.

[Effect of the Invention]

According to the present invention, a semiconductor device embedded card has a structure with laminated layers. At least one of the layers has a structure in which partial regions in a crosswise direction and in a lengthwise direction and formed at the substantially central portion of the card body becomes bent more easily than other regions. The semiconductor device is embedded at a position which is eccentric to the center of the card body excluding the partial regions. With this structure, the semiconductor device embedded in the card can be protected even if the card body has bent due to an external force.

#### 4. Brief Description of the Drawings

Fig. 1 is a plan view of a semiconductor device embedded card according to an embodiment of the present invention.

Fig. 2 is a cross-sectional view of the

semiconductor device embedded card taken along line A-A of Fig. 1.

Fig. 3 is a plan view of a semiconductor device embedded card according to another embodiment of the present invention.

1, 11 ... Card body

2, 12 ... Intermediate member

3 ... IC chip